U.S. Department
of Transportation
**Federal Aviation
Administration**

Aviation Safety

800 Independence Ave
Washington, DC 20591

In the matter of the petition of

DRONEXUM, LLC

For an exemption from §§ 61.3(a)(1)(i); 91.7(a); 91.119(c); 91.121; 91.151(b); 91.403(b); 91.405(a); 91.407(a)(1); 91.409(a)(1) and (2); 91.417(a) and (b); 137.19(c), (d), (e)(2)(ii), (e)(2)(iii) and (e)(2)(v); 137.31; 137.33; 137.41(c); and 137.42; of Title 14, Code of Federal Regulations

Exemption No 18413A
Regulatory Docket No. FAA-2019-0802

GRANT OF EXEMPTION

By letter dated February 2, 2020, and additional information posted to the docket April 30, 2020, Ms. Kelly Neubecker, Chief Executive Officer, UASolutions Group Inc., petitioned the Federal Aviation Administration (FAA) on behalf of DroneXum, LLC (DroneXum), 55 NW 9th Avenue, Homestead, FL 33030 to amend Exemption No. 18413 to provide relief from condition and limitation 27(c) of the referenced exemption. Exemption No. 18413 granted DroneXum relief from Title 14, Code of Federal Regulations (14 CFR) 61.3(a)(1)(i); 91.7(a); 91.119(c); 91.121; 91.151(b); 91.405(a); 91.407(a)(1); 91.409(a)(1) and (2); 91.417(a) and (b); 137.19(c), (d), (e)(2)(ii), (e)(2)(iii), and (e)(2)(v); 137.31; 137.33; 137.41(c); and 137.42.

The proposed amendment of Exemption No. 18413, if granted, would allow DroneXum to operate the HSE-UAV AG V8A+ v2 unmanned aircraft system (UAS), weighing 55 pounds (lbs.) or more, within the National Airspace System (NAS) for controlled, low-risk, precision commercial multi spectral crop analysis; ground moisture analysis; herbicide; and pesticide and insecticide application closer than 500 feet near vessels, vehicles, and structures.

The petitioner requests additional relief from the following regulations:

> Section 91.119(c) prescribes, in pertinent part, that except when necessary for takeoff or landing, no person may operate an aircraft below the following altitudes over other than congested areas. An altitude of 500 feet above the surface, except over open water or sparsely populated areas. In those cases, the aircraft may not be operated closer than 500 feet to any person, vessel, vehicle, or structure.

The petitioner supports its request with the following information:

As part of its safety risk analysis, the FAA relied on materials marked as "proprietary" by the petitioner to make determinations about the petitioner's capabilities. Accordingly, while these materials have not been released in their entirety, they have been identified in the docket for this exemption. See Attachment 1.

The petition for exemption describing the proposed operations and the regulations from which the petitioner seeks exemption is posted to the docket. To view the petition, visit http://www.regulations.gov, enter the regulatory docket number FAA-2019-0802 into the search box and click "Search," then click on the "Open Docket Folder" link next to a result associated with the docket number.

On February 2, 2020, the petitioner filed a request for amendment of Exemption No. 18413. The petitioner specifically seeks relief from condition and limitation 27(c) of Exemption No. 18413, which states:

> 27. All flight operations must be conducted at least 500 feet from all persons who are not directly participating in the operation, and from vessels, vehicles, and structures, unless when operating:
> ……
> c. *Near vessels vehicles and structures*. Prior to conducting operations, the operator must obtain permission from a person with the legal authority over any vessels, vehicles or structures that will be within 500 feet of the unmanned aircraft (UA) during operations. The pilot in command (PIC) must make a safety assessment of the risk of operating closer to those objects and determine that it does not present an undue hazard.

The FAA's analysis is as follows:

The FAA analyzed the relief granted previously to DroneXum in Exemption Number 18413 from §§ 61.3(a)(1)(i); 91.7(a); 91.121; 91.151(b); 91.405(a); 91.407(a)(1); 91.409(a)(1) and

(2); 91.417(a) and (b); 137.19(c), (d), (e)(2)(ii), (e)(2)(iii), and (e)(2)(v); 137.31; 137.33; 137.41(c); and 137.42, and determined that in consideration of the amended concept of operations, the FAA must revise the conditions and limitations of this exemption in order for those operations to be conducted without an adverse effect on safety.

As noted previously, the petitioner requested relief from condition and limitation 27(c) of Exemption No. 18413 to operate closer than 500 feet to vessels, vehicles, and structures. The additional relief would expand the relief already granted from § 91.119(c), *Minimum safe altitudes: General*. The petitioner supports its request for expanded relief by proposing to implement mitigations including altitude, speed, time restrictions, geofencing and obstacle avoidance, location, geographical alignment, and posting of signs, in addition to the use of their existing safety management system (SMS) program to identify and mitigate risks in the operations. The FAA analyzed the petitioner's proposed mitigations and determined that they are insufficient and that additional conditions and limitations would be necessary to ensure there would be no adverse effect on safety.

Based on its analysis, the FAA determined that the proposed altitude and speed restrictions, increased pilot experience, and the UAS's geofencing, combined with the petitioner's existing SMS program would have to be supplemented by all other conditions and limitations required in this exemption, to adequately mitigate the increased risk of operating closer than 500 feet, but no less than 100 feet, from vessels, vehicles or structures. Additionally, the FAA determined that operations closer than 100 feet to vessels, vehicles or structures may be conducted if the operator obtains permission from a person with the legal authority over the subject vessels, vehicles, or structures. The FAA determined the petitioner's proposed mitigations of location, time restrictions, geographical alignment, and posting of signs was not necessary to ensure safety, therefore, the FAA did not include conditions and limitations effectuating those proposed mitigations. The FAA determined the following mitigations are necessary to ensure that there amended operations do not cause an adverse effect.

The FAA's analysis of UA speed and altitude, pilot experience, and geo-fencing follows:

UA speed and altitude. The FAA considered the maximum distance a UA could travel in the event of a complete power loss. Based on formulas developed by FAA subject matter experts, the FAA determined that, in the event of a complete power loss, a UA flying at a ground speed of 15 mph at an altitude of 20 feet above ground level (AGL), could travel 24.6 feet before ground impact.[1] However, because the FAA cannot predict all possible failure modes, the FAA determined that adding a distance buffer is necessary to ensure safety. Accordingly, the FAA conducted further analysis and determined that by increasing the maximum distance a UA could travel in the event of a complete power loss by a factor of 4, the probability of impact with an object decreases by a factor of 16.[2] In other words, if a malfunctioning UA

[1] Distance travelled = ground speed (mph) x 1.466 x √(height/16)
[2] The inverse square formula is 1/distance^2

continued flight, the probability of that UA hitting an object 100 feet away is 16 times less likely than the probability of the UA a hitting an object 25 feet away. Therefore, based on UA speed and altitude, the FAA determined 100 feet is a safe minimum distance.

Pilot experience. The FAA has determined increased pilot experience can reduce risk. For example, the flying hour and experience requirements for a commercial pilot are greater than those for a private pilot.[3] Likewise, the FAA has determined that an agricultural aircraft pilot operating over a congested area requires more experience than does a pilot operating over a non-congested area.[4] While manned and unmanned aircraft flight experience are not directly equivalent, the principle that risk may be mitigated through increased pilot experience is applicable to both. Moreover, just as § 137.53 requires pilots conducting operations over congested areas to have increased flight experience, this amended exemption requires pilots of UAS agricultural aircraft conducting operations closer than 500 feet to vessels, vehicles or structures to also have increased experience. However, manned and unmanned pilot flying hour experience is not the same. The FAA notes UAS aerial application flights, on average, last 9-12 minutes per flight, while manned aerial application flights last, on average, 51 minutes per flight.[5] Accordingly, for agricultural aircraft operations, one hour of UAS pilot experience can be compared to four hours of manned aircraft pilot experience. Therefore, the pilot flying hour experience conditions and limitations in this exemption are based on a per flight operations ratio of 4:1.

Geo-fencing. The HSE-UAV AG V8+v2 is equipped with redundant GPS flight control systems with geo-fencing. The geo-fence restricts UA operations to within pre-programmable flight boundaries. As a failsafe, for operations closer than 500 feet to vessels, vehicles or structures, the conditions and limitations of this exemption requires the geo-fencing feature to be active with a boundary set no closer than 100 feet from applicable waterways, roadways, or structures.

The FAA also considered § 137.49, *Operations over other than congested areas*, which permits agricultural aircraft to operate closer than 500 feet to vessels, vehicles, or structures during the actual dispensing operation. Moreover, the FAA considered § 91.119(d), which permits helicopters, powered parachutes, and weight-shift-control aircraft to operate at less than the minimums prescribed in § 91.119(c). The HSE-UAV AG V8A+ v2 is smaller, slower, carries no flammable fuel, and carries less economic poison than a manned aircraft engaged in agricultural aircraft operations, and therefore presents less hazard than larger and faster manned aircraft. Additionally, because of their size, speed, and maneuverability, UA are better suited for operations in confined areas where roadways, obstructions, or nearby structures result in increased risk. Given the above, the FAA finds relief from § 91.119(c) to

[3] 14 CFR part 61 Sections 61.109, *Aeronautical experience* and 61.129, *Aeronautical experience.*
[4] 14 CFR Section 137.53, *Operation over congested areas: Pilots and aircraft.*
[5] Report to Congress: UAS and Chemical Aerial Application, under the FAA Reauthorization Act of 2018, Public Law 115-254, Section 361, October 2019.

permit operations closer than 500 feet to vessels, vehicles, or structures in accordance with this exemption would not adversely affect safety because the petitioner will comply with the conditions and limitations in this exemption.

For the reasons stated above, Conditions and Limitations number 27 is being amended to specify conditions for operations closer than 500 feet to vessels, vehicles or structures.

Additional Amendments

Exemption No. 18413 did not address § 91.403(b) and neither the original petition nor the petition for amendment included a request for relief from said section. However, the FAA has determined that 14 CFR part 91, subpart E ("Maintenance, Preventative Maintenance, and Alterations") applies to UAS operations conducted under the general operating and flight rules of part 91. This is consistent with FAA's determination in Exemption 18596, FAA-2018-0857, issued to Overwatch Aero, LLC. Since the petitioner is unable to comply with the requirements of subpart E, including 91.403(b), the relief is necessary. The relief from § 91.403(b), addressed in the exemption, is limited only to how to perform maintenance, preventive maintenance, or alterations on an aircraft other than as prescribed in that subpart and other applicable regulations, including part 43 of Title 14. To ensure a level of safety equivalent to what would be achieved by strict compliance with those regulations, the FAA will require, as part of this exemption, that the operator follows the UAS manufacturers' operating limitations, maintenance instructions, service bulletins, overhaul, replacement, inspection, and life limit requirements for the UAS and its components. Additionally, each UAS operated under this exemption must comply with all manufacturers' safety bulletins. Furthermore, maintenance must be performed by individuals who have been trained by the operator in proper techniques and procedures for these UAS. And finally, all maintenance must be recorded in the aircraft records; including a brief description of the work performed, date of completion, and the name of the person performing the work. Based on the information provided by the petitioner and the petitioner's compliance with the conditions and limitations provided in this amendment to the petitioner's exemption, relief from the referenced portion of § 91.403(b) would not adversely affect safety.

For the reasons stated above, Conditions and Limitations number 12 is being amended to specify maintenance requirements, training, and recordkeeping; and

Additionally, the FAA is also amending Conditions and Limitations numbers 1, 2, 3, 4, 7, 8, 13, 14, 15, 17, 19, 23, 24, 28, and 29 to effect certain minor editorial changes.

Public Interest

The FAA finds that an amendment to the exemption is in the public interest. The FAA permits manned aircraft engaged in agricultural aircraft operations to operate closer than 500 feet to

vessels, vehicles, or structures during dispensing operations.[6] Manned aircraft can weigh thousands of pounds and carry hundreds of gallons of fuel and payload. Conversely, the HSE-UAV AG V8A+ v2 weighs much less than a manned aircraft, carries a much smaller payload, carries no flammable fuel, and is slower and more maneuverable. Therefore, the hazard presented by the HSE-UAV AG V8A+ v2 to a vessel, vehicle, or structure is far less than that of a manned aircraft. Additionally, because of their size, speed, and maneuverability, UA are better suited for operations in confined areas where roadways, obstructions, or nearby structures result in increased risk. For that reason, permitting UA to operate closer than 500 feet to vessels, vehicles, or structures during dispensing operations reduces the exposure of both manned aircraft and property owners to safety risk and is therefore in the public interest.

The table below summarizes the FAA's determinations regarding regulatory relief applicable to this amendment:

Relief considered (14 CFR §)	**FAA determination**
91.119(c)	Relief granted with conditions and limitations
91.403(b)	Relief granted with conditions and limitations

Additionally, as required in the conditions and limitations below, the petitioner's agricultural aircraft operator certificate indicates the HSE-UAV AG V8A+ v2 may meet the definition of a foreign civil aircraft. Before conducting operations under this exemption, the petitioner may have to obtain a Foreign Aircraft Permit pursuant to § 375.41, if part 375 applies to the operations permitted in this exemption. This exemption does not waive or exempt any requirement of part 375.

Discussion of Public Comments:

A summary of the petition was published in the Federal Register on August 4, 2020 (85 FR 47287). One comment was received from the Airline Pilots Association, International (ALPA).[7]

ALPA stated that they cannot support the petition without further understanding and assurances of mitigating measures for a UAS that weighs 100 lbs. or more. ALPA expressed concerns with the number of 14 CFR parts affected and the scope of relief requested. ALPA also expressed concerns about FAA processes for nationwide, beyond line of sight (BVLOS), commercial UAS package delivery operations. They also expressed concerns that because the petitioner's manuals are proprietary, they cannot appropriately review and comment on the petition for exemption. ALPA opposed the petitioner's request to amend condition and limitation 27(c), because, if granted, it will put the public at increased risk without mitigation. ALPA expressed concerns about reliability, safety, and operation of the UAS; pilot minimum

[6] §137.49 Operations over other than congested areas.
[7] The full text of ALPA's comment may be viewed at www.regulations.gov, Docket FAA-2019-0802-0008.

qualifications and requirements; biohazard procedures; see and avoid; pilot and observer(s) communication; flammability assessment of lithium-ion and lithium-ion polymer battery cell designed for aircraft power usage; command and control (C2) link failure modes, strategies and mitigations; and then listed their concerns by regulation. Finally, ALPA mentioned that that because the exemption is not for a single specific operation or location, the FAA's oversight task could increase and could tax FAA resources, especially in light of the COVID-19 pandemic.

The FAA has considered ALPA's concerns. Regarding the 14 CFR parts and regulations noted by ALPA, the FAA has previously provided the cited regulatory relief to the petitioner in Exemption No. 18413.

ALPA's concern about FAA processes for nationwide, BVLOS, commercial UAS package delivery operations, while noted, is beyond the scope of this exemption.

ALPA correctly cited § 11.35(b) as the rationale why proprietary information is not posted on the Docket. If received, the FAA will process a Freedom of Information Act (FOIA) request for proprietary information under the Department of Transportation (DOT) procedures found in 49 CFR part 7.

The FAA recognizes the concerns ALPA expressed regarding interference with manned aircraft operations and has incorporated associated conditions and limitations into this exemption: issuance of a Notice to Airman (NOTAM) for all operations; UAS must be equipped with an active geo-fence boundary; and the remote pilot in command and visual observer must be able to communicate verbally at all times (electronic messaging or texting are prohibited during flight operations). Additionally, the FAA already requires additional conditions and limitations designed to mitigate certain aspects of the petitioner's operation. Examples include a requirement for one or more Visual Observers (VO) during flight operations, altitude limits of 200 feet above ground level, a speed restriction of 30 miles per hour, and FAA observation of PIC knowledge and skills required by 14 CFR 137.19(e). The revised condition and limitations requiring reduced groundspeed, lower altitude, increased pilot experience, and more stringent airworthiness requirements mitigate the additional risk of operating closer than 500 feet to vessels, vehicles or structures.

Furthermore, the FAA has concluded the public interest in permitting the operations, described in this exemption and in Exemption No. 18009, on which Exemption No. 18143 is based, outweighs the concerns ALPA expressed regarding operational locations and FAA oversight. The conditions and limitations under which the petitioner will operate the UAS, combined with the design features, risk mitigation measures described in the operating documents, and the provisions of the FAA-required Certificate of Authorization (COA) address the risks the proposed operations present. As a result, the FAA concludes the operations the petitioner proposes will not adversely affect safety.

The FAA's Decision

In consideration of the foregoing, I find that a grant of exemption is in the public interest. Therefore, pursuant to the authority contained in 49 U.S.C. 106(f), 40113, 44701, and 44807, delegated to me by the Administrator, DroneXum, LLC is granted an exemption from 14 CFR 61.3(a)(1)(i); 91.7(a); 91.119(c); 91.121; 91.151(b); 91.403(b); 91.405(a); 91.407(a)(1); 91.409(a)(1) and (2); 91.417(a) and (b); 137.19(c), (d), (e)(2)(ii), (e)(2)(iii), and (e)(2)(v); 137.31; 137.33; 137.41(c); and 137.42 to the extent necessary to allow DroneXum to operate the HSE-UAV AG V8A+ v2 UAS weighing more than 55 pounds (lbs.) but no more than 98.8 lbs. to provide commercial agricultural-related services, subject to the conditions and limitations described below.

Conditions and Limitations

In this grant of exemption, DroneXum, LLC is hereinafter referred to as the operator or exemption holder.

A copy of the 49 USC 44807 Blanket COA has been enclosed in this exemption.

Failure to comply with any of the conditions and limitations of this grant of exemption will be grounds for the immediate suspension or rescission of this exemption.

1. Operations authorized by this grant of exemption include the HSE-UAV AG V8A+ v2 as described in the operating documents with a maximum take-off weight not to exceed 98.8 pounds, and are limited to agricultural aircraft operations. Additionally, the HSE-UAV AG V8A+ v2 aircraft must be listed on the operator's Title 14, Code of Federal Regulations (14 CFR) part 137 Letter of Authorization (LOA) prior to use in any part 137 operation.

2. This exemption does not excuse the operator from complying with part 375. If operations under this exemption involve the use of foreign civil aircraft, the operator must obtain a Foreign Aircraft Permit pursuant to § 375.41 before conducting any operations under this exemption. Application instructions are specified in §375.43.

3. The HSE-UAV AG V8A+ v2 described in this exemption may not be operated at a groundspeed exceeding 30 miles per hour or at any speed greater than the maximum operating speed recommended by the aircraft manufacturer, whichever is lower.

4. All operations must be conducted in accordance with an Air Traffic Organization (ATO) issued Certificate of Authorization (COA). The exemption holder must apply for a new or amended COA if it intends to conduct operations that cannot be conducted

under the terms of the COA. If a conflict exists between the COA and this condition, the more restrictive provision will apply. The COA will also require the operator to request a Notice to Airmen (NOTAM) not more than 72 hours in advance, but not less than 48 hours prior to each operation. Unless the COA or other subsequently issued FAA authorization specifies an altitude restriction lower than 200 feet above ground level (AGL), operations under this exemption may not exceed 200 feet AGL. Altitude must be reported in feet AGL.

5. The pilot in command (PIC) must be designated before the flight and cannot transfer his or her designation for the duration of the flight. In all situations, the PIC is responsible for the safety of the operation. The PIC is also responsible for meeting all applicable conditions and limitations as prescribed in this exemption and ATO-issued COA, and operating in accordance with the operating documents. The aircraft must be operated within visual line of sight (VLOS) of the PIC at all times. The PIC must be able to use human vision unaided by any device other than corrective lenses, as specified on the PIC's FAA-issued airman medical certificate.

6. The PIC may manipulate flight controls in the operation of no more than one unmanned aircraft at the same time. Proposed operation of more than one unmanned aircraft at the same time (by one PIC) requires a new petition or a petition to amend this exemption.

7. All operations must utilize the services of at least one or more visual observers (VO). The VO must be trained in accordance with the operator's training program. For purposes of this condition, a VO is someone: (1) who maintains effective communication with the PIC at all times; (2) who the PIC ensures is able to see the unmanned aircraft with human vision as described in Condition and Limitation No. 5; and (3) coordinates with the PIC to scan the airspace where the unmanned aircraft (UA) is operating for any potential collision hazard and maintain awareness of the position of the UA through direct visual observation. The aircraft must be operated within VLOS of both the PIC and VO at all times. The operation must be conducted with a dedicated VO who has no collateral duties and is not the PIC during the flight. The VO may be used to satisfy the VLOS requirement as long as the PIC always maintains VLOS capability. The VO and PIC must be able to communicate verbally at all times; electronic messaging or texting is not permitted during flight operations. The VO must maintain visual sight of the aircraft at all times during flight operations without distraction. The PIC must ensure that the VO can perform the duties required of the VO. If either the PIC or a VO is unable to maintain VLOS with the UA during flight, the entire flight operation must be terminated as soon as practicable.

8. This exemption and all documents needed to operate the unmanned aircraft system (UAS) and conduct its operations in accordance with the Conditions and Limitations stated in this grant of exemption, are hereinafter referred to as the operating documents.

DroneXum, LLC Flight Operations and Procedures Manual, Firmware Update Procedures, Emergency Procedures, Manufacturer's Manual for the HSE-UAV AG V8A+ v2, Maintenance Procedures Manual, all Preflight Checklists, and this Exemption and any ATO-issued COA that applies to operations under this exemption must be accessible during all UAS operations that occur under this exemption and made available to the Administrator upon request. If a discrepancy exists between the conditions and limitations in this exemption and the procedures outlined in the operating documents, the Conditions and Limitations herein take precedence and must be followed. Otherwise, the operator must follow the procedures as outlined in its operating documents. The operator may update or revise its operating documents. It is the operator's responsibility to track such revisions and present updated and revised documents[8] to the Administrator or any law enforcement official upon request. The operator must also present the most current documents if it petitions for extension of or amendment to this grant of exemption. If the operator determines that any update or revision would affect the operator's ability to comply with any requirement of this exemption, then the operator must petition for an amendment to its grant of exemption. If questions arise regarding updates or revisions to the operating documents, the operator may contact the Flight Standards Service General Aviation and Commercial Division (AFS-800), 55 M Street, SE, 8th Floor, Zone 1, Washington, DC 20003. Telephone: 202-267-1100, Email: 9-AFS-800- Correspondence@faa.gov.

9. Any aircraft that has undergone maintenance or alterations that affect the UAS operation or flight characteristics (e.g., replacement of a flight-critical component) must undergo a functional test flight prior to conducting further operations under this exemption. Functional test flights may only be conducted by a PIC with a VO and other personnel required to conduct the functional flight test (such as a mechanic or technician) and must remain at least 500 feet from other people. The functional test flight must be conducted in such a manner so as to not pose an undue hazard to persons and property.

10. The operator is responsible for maintaining and inspecting all aircraft to be used in the operation and ensuring that they are all in a condition for safe operation.

11. Prior to each flight, the PIC must conduct a pre-flight inspection and determine the aircraft is in a condition for safe flight. The pre-flight inspection must account for all potential discrepancies, such as inoperable components, items, or equipment. If the inspection reveals a condition that affects the safe operation of the UAS, the aircraft is prohibited from operating until the necessary maintenance has been performed, and the aircraft is found to be in a condition for safe flight.

[8] Updated documents should be sent to the FAA General Aviation and Commercial Division (AFS-800).

12. The operator must follow the UAS manufacturers' operating limitations, maintenance instructions, service bulletins, overhaul, replacement, inspection, and life limit requirements for the HSE-UAV AG V8A+ v2 and its components. Each UAS operated under this exemption must comply with all manufacturers' safety bulletins. Maintenance must be performed by individuals who have been trained by the operator in proper techniques and procedures for these UAS. All maintenance must be recorded in the aircraft records including a brief description of the work performed, date of completion and the name of the person performing the work.

13. PIC certification: Under this exemption, a PIC must hold a current remote pilot certificate.

14. The PIC must also hold at least a current FAA second-class airman medical certificate. The PIC may not conduct the operation if he or she knows or has reason to know of any medical condition that would make him or her unable to meet the requirements for at least a second-class medical certificate, or is taking medication or receiving treatment for a medical condition that results in the PIC being unable to meet the requirements for at least a second-class medical certificate. The VO or any other direct participant may not participate in the operation if he or she knows or has reason to know of any physical or mental condition that would interfere with the safe operation of the aircraft.

15. The PIC must demonstrate the ability to safely operate the UAS in a manner consistent with how it will be operated under this exemption. The PIC must demonstrate the applicable knowledge and skills requirements for agricultural aircraft operations outlined in part 137, evasive and emergency maneuvers, and maintaining appropriate distances from persons, vessels, vehicles and structures before operating non-training, proficiency, or experience-building flights under this exemption. Additionally, all PICs must satisfactorily complete the operator's training program requirements, the completion of which must be documented. Furthermore, the PIC must satisfactorily demonstrate his or her ability to respond appropriately to a lost-link occurrence as part of the knowledge and skill assessment that will occur in accordance with § 137.19(e). PIC qualification flight hours and currency may be logged in a manner consistent with § 61.51(b). However, time logged for UAS operations may not be recorded in the same columns or categories as time accrued during manned flight, and UAS flight time does not count toward total flight time required for any part 61 requirement.

16. All training operations must be conducted during dedicated training sessions and may not be conducted for compensation or hire. Furthermore, the PIC must operate the UA not closer than 500 feet to any nonparticipating person while conducting training operations.

17. UAS operations may not be conducted during night, as defined in § 1.1. All

operations must be conducted under visual meteorological conditions (VMC). Operations may not be conducted under special visual flight rules (SVFR).

18. The aircraft may not be operated less than 500 feet below or less than 2,000 feet horizontally from a cloud or when visibility is less than 3 statute miles from the PIC.

19. For UAS operations where global positioning system (GPS) signal is necessary to safely operate the aircraft, the PIC must immediately recover/land the UA upon loss of GPS signal.

20. If the PIC loses command or control link, the aircraft must follow a pre-determined route to either reestablish link or immediately recover or land.

21. The PIC must abort the flight operation if unexpected circumstances or emergencies arise that could degrade the safety of persons or property. The PIC must terminate flight operations without causing undue hazard to persons or property in the air or on the ground.

22. The PIC is prohibited from beginning a flight unless (considering wind and forecast weather conditions) there is enough available power for each aircraft involved in the operation to conduct the intended operation with sufficient reserve such that in the event of an emergency, the PIC can land the aircraft in a known area without posing an undue risk to aircraft or people and property on the ground. In the alternative, if the manufacturer's manual, specifications, or other documents that apply to operation of the HSE-UAV AG V8A+ v2 recommend a specific volume of reserve power, the PIC must adhere to the manufacturer's recommendation, as long as it allows the aircraft to conduct the operation with sufficient reserve and maintain power to land the aircraft in a known area without presenting undue risks, should an emergency arise.

23. This exemption does not grant relief from the requirements concerning registration and marking of aircraft. All aircraft operated in accordance with this exemption must be identified by serial number, registered in accordance with part 47, and have identification (N-Number) markings in accordance with part 45, Subpart C. Markings must be as large as practicable.

24. Documents used by the operator to ensure the safe operation and flight of the UAS and any documents required under §§ 91.9, 91.203, and 137.33 must be available to the PIC at the ground control station of the UAS any time any aircraft operates in accordance with this exemption. These documents must be made available to the Administrator or any law enforcement official upon request.

25. The UA must remain clear and give way to all manned aviation operations and

activities at all times.

26. The UAS may not be operated by the PIC from any moving device or vehicle.

27. All flight operations must be conducted at least 500 feet from all persons who are not directly participating in the operation, and from vessels, vehicles, and structures, unless when operating:

    a. *Over or near people directly participating in the operation of the UAS.* No person may operate the UAS directly over a human being unless that human being is directly participating in the operation of the UAS, to include the PIC, VO, and other personnel who are directly participating in the safe operation of the UA.

    b. *Near nonparticipating persons.* Except as provided in subsection (a) of this section, a UA may only be operated closer than 500 feet to a person when barriers or structures are present that sufficiently protect that person from the UA and/or debris or hazardous materials such as fuel or chemicals in the event of an accident. Under these conditions, the operator must ensure that the person remains under such protection for the duration of the operation. If a situation arises, in which the person leaves such protection and is within 500 feet of the UA, flight operations must cease immediately in a manner that does not cause undue hazard to persons.

    c. *Closer than 500 feet from vessels, vehicles and structures.* The UA may be operated closer than 500 feet, but not less than 100 feet, from vessels, vehicles, and structures under the following conditions:
        (1) The UAS is equipped with an active geo-fence boundary, set no closer than 100 feet from applicable waterways, roadways, or structures;
        (2) The PIC must have a minimum of 7 hours experience operating the specific make and model UAS authorized under this exemption, at least 3 hours of which must be acquired within the preceding 12 calendar months;
        (3) The PIC must have a minimum of 25 hours experience as a PIC in dispensing agricultural materials or chemicals from a UA;
        (4) The UA may not be operated at a groundspeed exceeding 15 miles per hour;
        (5) The UA altitude may not exceed 20 feet AGL; and
        (6) The PIC must make a safety assessment of the risk of operating closer than 500 feet from those objects and determine that it does not present an undue hazard.

    d. *Closer than 100 feet from vessels, vehicles and structures.* The UA may operate closer than 100 feet from vessels, vehicles, and structures in accordance with the conditions listed in 27.c. (2) through (6) and the following additional conditions:

(1) The UAS is equipped with an active geo-fence boundary, set to avoid the applicable waterways, roadways, or structures; and
(2) The operator must obtain permission from a person with the legal authority over any vessels, vehicles or structures prior to conducting operations closer than 100 feet from those objects.

28. All operations shall be conducted from and over predetermined, uninhabited, segregated, private or controlled-access property as described in the operator's Flight Operations Procedures Manual. The PIC must ensure the entire operational area will be controlled[9] to reduce risk to persons and property on the ground, as well as other users of the National Airspace System (NAS). This area of operation will include a defined lateral and vertical area where the aircraft will operate and must be geo-fenced to prevent any lateral and vertical excursions by the operating aircraft. Safety procedures must be established for persons, property and applicable airspace within the area of operation. A briefing must be conducted regarding the planned UAS operations prior to operation at each location of operation in which the operator has not previously conducted agricultural aircraft operations. All personnel who will be performing duties within the boundaries of the area of operation must be present for this briefing. Additionally, all operations conducted under this exemption may only occur in areas of operation that have been physically examined by the operator prior to conducting agricultural aircraft operations and in accordance with the associated COA.

29. Any incident, accident, or flight operation that transgresses the lateral or vertical boundaries of the operational area as defined by the applicable COA must be reported within 24 hours as required by the applicable COA issued by the FAA ATO. Additionally, any incident or accident that occurs, or any flight operation that transgresses the lateral or vertical boundaries of the operational work area, must be reported to the Flight Standards District Office (FSDO) that holds the operator's part 137 certificate.

Unless otherwise specified in this grant of exemption, the UAS, PIC, and operator must comply with all applicable parts of 14 CFR including, but not limited to, parts 45, 47, 91, and 137. In addition, the operator must comply with all limitations and provisions of the operator's agricultural aircraft operator certificate, which the operator must obtain prior to conducting agricultural operations in accordance with § 137.11.

[9] The operator will control access to minimize hazards to persons and property in the air and on the ground.

If you request an extension or amendment to this exemption, please submit your request by using the Regulatory Docket No. FAA-FAA-2019-0802 (http://www.regulations.gov). In addition, you should submit your request no later than 120 days prior to the exemption's expiration date listed below, or 120 days before you need the amendment.

Any extension or amendment request must meet the requirements of § 11.81.

This exemption terminates on June 30, 2023, unless sooner superseded or rescinded.

Issued in Washington, D.C., on May 21, 2021. .

Sincerely,

/s/

Robert C. Carty
Deputy Executive Director, Flight Standards Service

Enclosure Exemption No. 18009 and 49 USC 44807 Blanket COA

Attachment 1

Supplemental Document(s)	Information Received
DroneXum, LLC Petition for Amendment (February 2, 2020)	The petition seeks to amend exemption 18413 to permit operations closer than 500 feet to vessels, vehicles, and structures.
DroneXum Safety Case	This safety case proposes mitigations to safely operate a UAS closer than 500 feet to vessels, vehicles, and structures.
Oak Harbor Aerial View	This is imagery of proposed operating locations.
DroneXum, LLC Petition for Exemption (October 1, 2019)	This is the original petition for exemption, Docket FAA-2019-0802.
DroneXum UAS Flight Operations and Procedures Manual	This manual contains detailed information describing DroneXum's procedures for UAS operations.
HSE AG-VA Flight Operations Checklists	These documents are DroneXum's UAS operational checklists.
DroneXum UAS Safety Management Systems (SMS)	This document contains safety policies and procedures. All DroneXum UAS activities will be conducted in accordance with safety policy and criteria established within this manual.
DroneXum UAS Aircrew Training and Procedures Program	This manual describes training for DroneXum UAS flight and ground crewmembers.
HSE AG-VA Operating Manual	This is the manufacturer's UAS operating manual.
Beihang University Inspection Report	This is an inspection report of the UAS test conducted by Beihang University's Advanced Flight Control Technology Lab.